WHAT IS CLAIMED IS

1.   A specific point detecting device for detecting positions of one or more specific points on a target image, comprising:

5   updating means for updating detection parameters for detecting said specific points, in such a way as to follow changes in how said specific points on said target image are viewed; and

        detecting means for detecting the positions of
10 said specific points on said target image, based on the detection parameters updated by said updating means.

2.   The device according to claim 1, wherein said target image is a first photographed
15 image photographed by first photographing means that is movable, and

        said specific points are static specific points in a real space.

20 3.   The device according to claim 2, wherein said detecting means further comprises:
        first calculating means for calculating the viewpoint position and/or posture of said first photographing means; and
25   narrowing means for narrowing specific points to be detected, based on the viewpoint position and/or posture calculated by said first calculating means.

4. The device according to claim 2,

wherein there is a plurality of said first photographing means,

said detecting means comprises a plurality of detecting units corresponding respectively to said plurality of first photographing means, and

said plurality of detecting units each detects the positions of said specific points in the first photographed image photographed by corresponding said first photographing means, based on the detection parameters updated by said updating means.

5. The device according to claim 2,

wherein said updating means comprises second photographing means in which the position and posture of the viewpoint and the focal distance are fixed, and

generating means for generating said detection parameters, based on a second photographed image photographed by said second photographing means, and

updates current detection parameters to detection parameters generated by said generating means.

6. The device according to claim 5,

wherein said updating means updates detection parameters so that said detecting means can use detection parameters generated based on said second

photographed image photographed at a time same as said first photographed image, and

said detecting means detects said specific points using detection parameters generated based on said second photographed image photographed at a time same as said first photographed image.

7. The device according to claim 5, comprising a plurality of second photographing means fixed on different viewpoint positions as said second photographing means,

wherein said generating means generates said detection parameters based on such a plurality of second photographed images.

8. The device according to claim 7,

wherein said plurality of second photographing means photographs one or more specific points in an overlapping manner,

said generating means generates detection parameters for the same specific point respectively based on photographed images obtained by a plurality of second photographing means, and

said detecting means detects the specific point based on a plurality of detection parameters with respect to the same point.

9.   The device according to claim 8,

    wherein said detecting means comprises viewpoint

position calculating means for calculating the

viewpoint position of said first photographing means,

5   and

    detects the positions of specific points, using

detection parameters generated based on second

photographing means nearest to the viewpoint position

calculated by said viewpoint position calculating means,

10   if there is a plurality of detection parameters

corresponding to the same specific point.

10.   The device according to claim 1,

    wherein said updating means comprises second

15   photographing means in which the position and posture

of the viewpoint and the focal distance are fixed, and

    generating means for generating said detection

parameters based on a second photographed image

photographed by said second photographing means, and

20   updates current detection parameters to parameters

generated by said generating means.

11.   The device according to claim 10, comprising a

plurality of second photographing means fixed to

25   different viewpoint positions, as said second

photographing means,

wherein said generating means generates said
detection parameters based on the plurality of second
photographed images.

5   12.   The device according to claim 11,
        wherein said plurality of second photographing
means photographs one or more specific points in an
overlapping manner,
        said generating means generates detection
10 parameters for the same specific point respectively
based on a plurality of second photographing means, and
        said detecting means detects the specific point
based on a plurality of detection parameters with
respect to the same specific point.
15

13.   The device according to claim 12,
        wherein if there is a plurality of detection
parameters corresponding to the same specific point,
said detecting means detects the specific point based
20 on each detection parameter, and a detected position by
the detection parameter having the best evaluation
value of detection accuracy is adopted, thereby
detecting the position of the specific point.

25 14.   The device according to claim 10,

wherein said generating means comprises supplying
means for supplying the position or area of said
specific point on said second photographed image, and

    extracts a partial image including said specific

5   point from said second photographed image based on the
position or area supplied by said supplying means, and
generates said detection parameters based on the
partial image.

10 15. The device according to claim 14,
    wherein said supplying means retains as known
information the position or area on said specific point
on said second photographed image, and supplies the
position or area.

15

    16. The device according to claim 14,
    wherein said supplying means retains as known
information the three-dimensional position of said
specific point and camera parameters of said second

20 photographing means,
    comprises specific point position calculating
means for calculating the position of said specific
point on said second photographed image, based on the
three-dimensional position of said specific point and

25 the camera parameters of said second photographing
means, and

supplies the position calculated by said specific point position calculating means.

17. The device according to claim 14,
     wherein said supplying means comprises feature extracting means for extracting a featured partial area from said second photographed image, and
     supplies the position or area of said featured partial area extracted by said feature extracting means.

18. The device according to claim 10,
     wherein said generating means generates detection parameters based on one photographed image photographed at a single time by said second photographing means.

19. The device according to claim 10,
     wherein said generating means generates detection parameters based on a plurality of photographed images photographed at a plurality of times by said second photographing means.

20. The device according to claim 10,
     wherein said updating means determines timing in which update of detection parameters is performed, based on the contents of said second photographed image.

21. The device according to claim 20,

wherein said updating means performs update of
detection parameters, if a degree of difference between
a new second photographed image and the second
photographed image at the time of latest update of
5   detection parameters exceeds a predetermined value.

22.   The device according to claim 20,
      wherein said updating means controls update of
detection parameters, based on changes in detection
10   parameters generated by said generating means.

23.   The device according to claim 1,
      wherein said updating means updates detection
parameters at a predetermined time interval.
15

24.   The device according to claim 1,
      wherein said updating means comprises storing
means for storing two or more kinds of detection
parameters prepared in advance for each of said
20   specific points, and
      selecting means for selecting a detection
parameter for detecting each specific point from two or
more kinds of detection parameters stored in said
storing means, in such a way as to follow changes in
25   how the specific point is viewed, and
      updates current detection parameters to detection
parameters selected by said selecting means.

25. The device according to claim 24,

wherein said selecting means selects detection parameters based on the average intensity value of said target image.

26. The device according to claim 1,

wherein said detection parameter is a template image including said specific points, and

said detecting means performs template matching for said target image to detect the positions of said specific points on said image.

27. The device according to claim 1,

wherein said detection parameters are information expressing color and/or intensity unique to said specific points, and

said detecting means extracts areas having the color and/or intensity unique to said specific points from said target image, thereby detecting the positions of said specific points on the image.

28. A specific point detecting method of detecting positions of one or more specific points on a target image, comprising:

the updating step of updating detection parameters for detecting said specific points, in such a way as to

follow changes in how said specific points on said

target image are viewed; and

the detecting step of detecting the positions of

said specific points on said target image, based on the

5 detection parameters updated in said updating step.

29. The method according to claim 28,

wherein said target image is a first photographed

image photographed in a first photographing step by

10 first photographing means that is movable, and

said specific points are static specific points in

a real space.

30. The method according to claim 29,

15 wherein said detecting step further comprises:

the first calculating step of calculating the

viewpoint position and/or posture of said first

photographing means, and

the narrowing step of narrowing specific points to

20 be detected, based on the viewpoint position and/or

posture calculated in said first calculating step.

31. The method according to claim 29,

wherein there is a plurality of said first

25 photographing means, and

in said detecting step, a plurality of detection processing corresponding respectively to said plurality of first photographing means is performed, and

in each of said plurality of detection processing, the positions of said specific points in the first photographed image photographed by corresponding said first photographing means are detected, based on the detection parameters updated by said updating means.

32. The method according to claim 29,

said updating step comprising:

the second photographing step of taking photographs by photographing means in which the position and posture of the viewpoint and the focal distance are fixed, and

the generating step of generating said detection parameters, based on a second photographed image photographed in said second photographing step are comprised,

wherein current detection parameters are updated to detection parameters generated in said generating step.

33. The method according to claim 32,

wherein in said updating step,

detection parameters are updated so that detection parameters generated based on said second photographed

image photographed at a time same as said first photographed image can be used in said detecting step, and

in said detecting step, said specific points are
5 detected using detection parameters generated based on said second photographed image photographed at a time same as said first photographed image.

34. The method according to claim 32,
10 wherein in said second photographing step, photographs are taken by a plurality of second photographing means fixed on different viewpoint positions, and

in said generating step, said detection parameters
15 are generated, based on such a plurality of second photographed images.

35. The method according to claim 34,

wherein said plurality of second photographing
20 means photographs one or more specific points in an overlapping manner, and

in said generating step, detection parameters for the same specific point are generated respectively based on photographed images obtained by a plurality of
25 second photographing means, and

in said detecting step, the specific point is detected, based on a plurality of detection parameters with respect to the same point.

5   36.   The method according to claim 35,
said detecting step comprising a viewpoint position calculating step of calculating the viewpoint position of said first photographing means,
wherein the position of specific points is
10   detected using detection parameters generated based on second photographing means nearest to the viewpoint position calculated in said viewpoint position calculating step, if there is a plurality of detection parameters corresponding to the same specific point.
15

37.   The method according to claim 28,
said updating step comprising:
the second photographing step of taking photographs by second photographing means in which the
20   position and posture of the viewpoint and the focal distance are fixed, and
the generating step of generating said detection parameters, based on a second photographed image photographed in said second photographing step are
25   comprised,

wherein current detection parameters are updated
to detection parameters generated in said generating
step.

5   38. The method according to claim 37,
wherein in said second photographing step,
photographs are taken by a plurality of second
photographing means fixed on different viewpoint
positions, and

10   in said generating step, said detection parameters
are generated, based on such a plurality of second
photographed images.

39. The method according to claim 38,
15   wherein said plurality of second photographing
means photographs one or more specific points in an
overlapping manner, and
in said generating step, detection parameters for
the same specific point are generated respectively
20 based on photographed images obtained by a plurality of
second photographing means, and
in said detecting step, the specific point is
detected, based on a plurality of detection parameters
with respect to the same specific point.

25

40. The method according to claim 39,

wherein in said detecting step, if there is a plurality of detection parameters corresponding to the same specific point, the specific point is detected based on each detection parameter, and a detected position from the detection parameter having the best evaluation value of detection accuracy is adopted, thereby detecting the position of the specific point.

41.   The method according to claim 37,
said generating step comprising a supplying step of supplying the position or area of said specific point on said second photographed image,
wherein a partial image including said specific point is extracted from said second photographed image based on the position or area supplied from said supplying step, and said detection parameters are generated based on the partial image.

42.   The method according to claim 41,
wherein in said supplying step,
the position or area on said specific point on said second photographed image is retained as known information, and the position or area is supplied.

43.   The method according to claim 41,
wherein in said supplying step,

the three-dimensional position of said specific

point and camera parameters of said second

photographing means are retained as known information,

the specific point position calculating step of

5 calculating the position of said specific point on said

second photographed image based on the three-

dimensional position of said specific point and the

camera parameters of said second photographing means is

comprised, and

10 the position calculated in said specific point

position calculating step is supplied.

44. The method according to claim 41,

wherein in said supplying step,

15 the feature extracting step of extracting a

featured partial area from said second photographed

image is comprised, and

the position or area of said featured partial area

extracted in said feature extracting step is supplied.

20

45. The method according to claim 37,

wherein in said generating step,

detection parameters are generated based on one

photographed image photographed at a single time in

25 said second photographing step.

46. The method according to claim 37,

wherein in said generating step,

detection parameters are generated based on a plurality of photographed images photographed at a plurality of times in said second photographing step.

47.   The method according to claim 37,

wherein in said updating step, timing in which update of detection parameters is performed is determined based on the contents of said second photographed image.

48.   The method according to claim 47,

wherein in said updating step, update of detection parameters is performed, if a degree of difference between a new second photographed image and the second photographed image at the time of latest update of detection parameters exceeds a predetermined value.

49.   The method according to claim 47,

wherein in said updating step, update of detection parameters is controlled, based on changes in detection parameters generated in said generating step.

50.   The method according to claim 28,

wherein in said updating step, detection parameters are updated at a predetermined time interval.

51. The method according to claim 28,

said updating step comprising:

the storing step of storing two or more kinds of detection parameters prepared in advance for each of

5   said specific points, and

the selecting step of selecting a detection parameter for detecting each specific point from two or more kinds of detection parameters stored in said storing step, in such a way as to follow changes in how

10 the specific point is viewed,

wherein current detection parameters are updated to detection parameters selected in said selecting step.

52. The method according to claim 51,

15 wherein in said selecting step, detection parameters are selected based on the average intensity value of said target image.

53. The method according to claim 28 wherein said

20 detection parameter is a template image including said specific points, and

in said detecting step, template matching is performed for said target image to detect the positions of said specific points.

25

54. The method according to claim 28,

wherein said detection parameters are information expressing color and/or intensity unique to said specific points, and

in said detecting step, areas having the color and/or intensity unique to said specific points are extracted from said target image, thereby detecting the positions of said specific points on the image.